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AN
ACCOUNT
OF SOME
Experiments and Observations
ON
TAR-WATER:

Wherein is shown the QUANTITY of
TAR that is therein.

Which was read before the ROYAL SOCIETY.

By STEPHEN HALES, D. D. F. R. S.

THE SECOND EDITION.

To which is added,

A LETTER from Mr. REID,
TO
Dr. H A L E S,

Concerning the NATURE of TAR, and a
METHOD of obtaining it's *Medical Virtues*,
free from it's *hurtful Oils*: Whereby also
the STRENGTH of each DOSE may be the
better ascertained.

L O N D O N:

Printed for R. MANBY and H. S. Cox on
Ludgate-Hill.

M. DCC. XLVII.

(Price One Shilling.)

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AN
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Experiments and Observations
ON
TAR-WATER:

I.
AS the celebrated Tar-water,
recommended by the worthy
and learned Bishop *Berkeley*,
is said to be taken with great Benefit
by some, and Detriment by others; I
thought it might probably be of use to
inquire whether any, or what Quan-
tity of Tar, there was in Tar-water,
made with different kinds of Tar,
different Degrees of stirring, and in dif-
ferent

ferent Ways of making it. A short Account of which I shall give, without interesting myself, either in Favour or Disfavour of a Medicine that is under the Inspection of the proper Judges, as well as of all the rest of the World.

2. UPON Inquiry from knowing Persons, I find that *Norway* or *Swedish* Tar, which is dark, thick and clear, without obscure Grains in it, is accounted the best, for the general Uses of Tar: But that the Tar which is made of the Tops of Fir-Trees, which are become very hard, by having lain long dead on the Ground, after having either fallen of themselves, or being killed by the draining off their Turpentine Sap, thro' Basin-like Notches cut near their Bottoms: (These Tops are commonly called Light-wood, the poorer People making use of them instead of Candles:) This Tar being burned in a very strong Fire of such dry

dry Wood, is of a very caustick, corroding Nature, so as to be hurtful to Ropes, &c. for which reason it is not used in the Royal Navy. But the *American* Tar, which is made of green Fir-Trees, with a less degree of Fire, is esteemed good, and is called green Tar; for which reason a Bounty, double the Value of the other, is allowed by the Government here, on Importation.

3. HAVING procured some *Norway* or *Swedish* Tar, which was thirty Years old, and very thick and stiff; I, according to the Bishop's Prescription, made Tar-water in the proportion of a Gallon of Water to a Quart of Tar, stirring it four Minutes: I then took a Pint of this Tar-water, and evaporated it away in a *Florence* Flask, cut to a wide Orifice, with a red-hot circular Iron, and weighed. Besides what flew off in Evaporation, there remained at the Bottom of the Flask

forty-four Grains of thick, dark, reddish Tar, of a bitterish burnt Taste. On evaporating a like quantity of Tar-water, made with common, coarse, stiff *American* Tar, in the same manner, there remained twenty-eight Grains of a like syrupy Tar; and sixty one Grains in a Pint of Tar-water made with a stiff Tar, just brought from *Norway*. This Water was high coloured on standing some days.

4. I evaporated away also a Pint of Tar-water, made with the old Tar, which had been stirred for half an Hour, in order to try how strongly it might be impregnated with Tar. There remained ninety-three Grains, which Residuum was not all of it a syrupy Tar, as the former, but partly incrustrated on the Sides of the Flask; which shews how much more of the grosser Tar was incorporated in this Water than in the other. This was also evident by its greater and more lasting

lasting Froth on shaking, and also by its deeper Colour, it becoming brown as Beer, on a few Days standing: And even the thinner kind of Tar, which was stirred for eight Minutes, had twenty-six Grains of Tar left, on Evaporation of a Pint of its Water. Hence we see the Effects of stirring Tar-water much.

5. FINDING forty-four Grains in a Pint of the first Water, Section or Numb. 13: it occurred to me, that probably there might be less Tar in the Water, if it could be made without stirring it with a Stick, which stirring may impel some of the grosser Tar into the Water, whence its too heating Quality is with good reason thought to arise. I therefore put half a Pint of Tar into a Tin Pot, whose Bottom was punched full of Holes, one sixth of an Inch in Diameter, and half an Inch

Inch distant from each other; which I found to be a proper Size for this very thick Tar; thro' which the Tar dropped gradually into a Quart of Water, when placed in hot Sunshine; or else at such a distance before a Fire, as would give a like Degree of Heat, sufficient to make it drop. But finding, on evaporating off a Pint of this thus prepared Tar-water, with Warmth, thirty-two Grains of thick Tar; for it is well known, that Fluids in a warm State will imbibe a greater Quantity of Matter, than when cold: I made another Tar-strainer, being a Box of Wood, which was square, and two and an half Inches wide in the Clear within, and eight Inches deep, with a Pewter Bottom, which had twenty-five Holes in it, one eighth of an Inch in Diameter: There was also a wooden Plug or Rammer, whose bottom part was exactly fitted to it; by which Plug the cold Tar was gradually forced, in slender Streams, like Rain, thro' the
the

the Bottom of the Strainer. There were fixed on each side of the Strainer Pieces of Wood two Feet long, like the Poles of Chairmens Chairs, on these the Strainer rested at a proper distance over the Pot of Water.

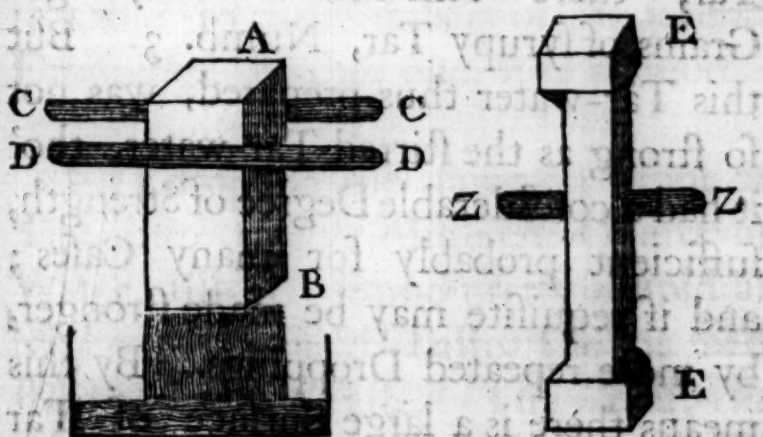


Fig. A B the Strainer-box. C C D D the Arms or Poles two Feet long to rest it on. **E E** the Plug. **Z Z**, a wooden Pin, which hindered the Bottom of the Plug from pressing hard on the Bottom of the Strainer.

I found but eighteen Grains of syrupy Tar, on evaporating a Pint of Tar-water thus prepared, by the same old Tar's dropping

dropping five times on it: And but six Grains in a like Quantity of Tar-water, made by dropping coarse *American* Tar five times on the same Water; whereas in a Pint of Tar-water made by stirring some of the same Tar, there remained twenty-eight Grains of syrupy Tar, Numb. 3. But this Tar-water thus prepared, was not so strong as the stirred Tar-water, tho' it had a considerable Degree of Strength, sufficient probably for many Cases; and if requisite may be made stronger, by more repeated Droppings. By this means there is a large Surface of Tar exposed to the Water, to be thereby impregnated with the Virtue of the Tar, without forcing in the grosser Parts, by stirring with a Stick: For it seems probable, that there is not so great a quantity of the Surface of the Tar exposed to the immediate Contact of the Water in stirring so stiff a Mass of Tar, as in the dropping way. This being something like Nature's Method
of

of impregnating mineral Waters, with the Virtue of *Petroleum*, or Tar of the Earth, as they gently glide among it: By this means likewise, there will be a greater Certainty, in adjusting the Strength of Tar-water; for the Strength of the Water will be proportionable to the numbers of the several Droppings, be they one, five or more.

6. I dropped the same half Pint of Tar, into twelve different Quarts of Water, till it became pretty insipid as to the saline, acid Taste, tho' it had still a tarrish Taste. The Acid, in which the Virtue is thought principally to reside, might be sensibly tasted in the fourth Quart, and farther; for the Drops of Tar are in every Operation formed, partly with a new Surface to expose to the Water. And it is observed in the Distillation of Turpentine, that some of this acid Spirit arises to the last, being still intangled in the Turpentine.

7. WHEN Tar-waters of different Degrees of Strength were put into *Florence* Flasks, with other inverted Flasks fixed on them, and all were placed in the same Vessel of hot Water; on breaking the upper Flasks, the volatile acid Spirit could very sensibly be tasted, especially that of the stronger Tar-water; which shows that these Waters are impregnated therewith: and which, when distilled from Turpentine, Dr. *Boerhaave* in his Chemistry says, is the best vegetable Acid that is known. This Acid in Tar-water will curdle Milk; yet Turpentine-water will not curdle Milk: which shows that Tar is considerably acidulated, by the Action of Fire in making. I find in a Pamphlet, intituled, *An Answer to a Letter to the Right Reverend the Bishop of Cloyne, occasioned by his Treatise on Tar-water*, that on distilling twenty-two Pounds of the best *Norway* Tar by two Retorts, there was

Acid

(11)

	Pounds.	Ounces.
Acid Spirit ———	1	2½
Oil ———	7	13
Pitch ———	12	14
	21	13½
Loft ———	0	2½
	22	

III.

8. **B**UT having procured four several Quantities of *Norway* or *Swedish* Tar, which was not so stiff, but more soft and oily than the Tars mentioned in Numb. 3. and which were esteemed by the Dealers in Tar to be very good for the common Purposes of Tar; I found much less Tar in the Tar-waters made with these, *viz.* only between five and fifteen Grains; and that, whether the Water were made by stirring four Minutes, or by dropping the same Tar five several times on the same Water, thro' the above-

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mentioned

mentioned Strainer ; so that the Strainer was of little use, to lessen the Quantities of Tar, in these kinds of Tar-waters ; tho' of use, the better to adjust the several Degrees of Strength desired : And also of considerable use, in abating the Quantities of Tar, in the Tar-waters made both of the stiff Tars, and also of the coarse *American* Tar, as appears by comparing the Events of each Manner of Preparation in Numb. 3, and 4. where it was found that the Tar-water made with the stiff Tar by stirring, had, in a Pint of it, forty-four Grains of *Residuum* ; and by dropping, eighteen Grains. The coarse *American* stiff Tar had twenty-eight Grains by stirring, and but six by dropping. But it was observable, when the Tar dropped on the Water thro' the Strainer, that the Quantity of Oil which separated from two of these thinner Tars, as it floated on the Surface of the Water, hindered the dropping Tar from sinking into the

the Water: For which reason it was needful, from time to time, to put the swimming Oil and Tar gently by with a Stick, and make it sink: But the Oil of the other Tars did not prevent their sinking down to the Bottom of the Water. Some of these Tars dropped very well through Holes, which were one eighth of an Inch in Diameter, without being forced through with the Plug.

9. 'Tis probable, that the greater Degree of Oilyness of these thinner Tars may prevent, in some measure, the grosser Tar from incorporating with the Water in stirring. And perhaps, on the same account, they may likewise have something less of what is called the acid Spirit: for the Water made with old, stiff, less unctuous Tar, and with stiff *Norway* Tar, seems to taste sensibly stronger of the acid Spirit, than that made with thinner, more unctuous Tar; on which account
the

the stiffer would be preferable, were it not, that it communicates too much of its grosser Parts also to the Water ; which yet is in a good measure prevented by the Strainer, as was found in Numb. 5. The Water made with the thinner Tar tastes much stronger of Soot, or Smoke, than that made with the stiff Tars. These stiffer Tars may probably be the latter Runnings of Tar in burning, for the last Runnings are so stiff as to be Pitch : so that the first Runnings, which come off with a small Degree of Fire, may probably therefore approach nearer to the Nature of Turpentine than the latter ; and the Smoke being less burnt, gives the stronger Taste.

10. SOME of the more volatile Parts doubtless fly off in making Tar ; for, as Dr. *Boerhaave* observes, the subtile, *Æthereal* Oil of Turpentine rises with a Heat equal to less than half the Heat of boiling Water ; which is of so very penetrating

penetrating a Nature, that being anointed on the Surface of the Body, it will soon give a violet Smell to the Urine; but Drinkers of Tar-water inform me, that it does not give a violet, but tar-rish Smell to the Urine.

IV.

II. **W**HEN we consider, that in burning Wood close covered up, either to make Charcoal or Tar, a considerable Quantity of the essential Salt is turned, by the Action of Fire, into fixed alkaline Salt; it seems not improbable, that a considerable part of whatever Virtue Tar-water has, may be owing not only to the subtile, volatile Acid of the Tar, but also to a fixed alkaline Salt, intimately united with the Oil of the Tar, and making thereby a penetrating, deterfive Soap. In the same manner as *Tachenius's* Salt is made, by burning Rosemary in a covered Vessel, whereby the fixed Salt and Oil are intimately united, and thereby

thereby become a mild, alkaline, saponaceous Substance, which, as Dr. *Boerhaave* observes, will mix well with the Humours of the Body. And may not even the subtile, volatile Salt, by the same means, be united with the subtile Oil, and thereby become a very penetrating, deterfive, and attenuating volatile Soap?

V.

12. **I** Filtrated these several Tar-waters, thro' filtering Paper, yet no Tar, nor oily Substance, remained in the Paper; not even of that Tar-water, which had no less than ninety-three Grains of Tar in a Pint of it, Numb. 4. nor were the filtering Papers, when dry, any more inflammable, where the Tar had passed, than in other Parts, which had not touched the Tar-water. Nor was the filtering Paper of the thinner Tar at all discoloured, tho' that of the stiff was as if smoked. Hence we see how intimately and minutely the

the Tar is mixed with the Water. No wonder then, since Water conveys so much Tar thro' the Filter, that it should also be a Vehicle to convey great Quantities of Tar into the Blood, as well as the Medicinal Virtue also into the finest and remotest Vessels of the Body, in the same manner that the Virtues of Mineral Waters are conveyed. Now Tar thus minutely divided, and blended in a great Quantity of Water, will be much less heating, than a like Quantity of Tar taken by it self, as is evident from many the like Instances.

13. AND as Tar is thus incorporated into the Water by stirring, so is the Water also thereby mixed with the Tar, so as to increase its Bulk very considerably. There is also a Water which separates from Tar, some time after it is made, and that in such Quantity, as to lay three or four Inches deep on the Tar. This Water, which is

so strongly impregnated with the acid Spirit, as to ferment with Chalk, is drank by the *Americans*, as a Cure of some of their Maladies.

14. I observed that a Quart of Water, which had half a Pint of Tar stirred in it for four Minutes, was sensibly stronger than two Quarts of Water made with a Pint of Tar stirred as long a Time. And there is good Reason why it should be so: for tho' a Pound of Sugar or Salt, by dissolving thoroughly, will make a double Quantity of Water, just as sweet or salt, as half a Pound will, half that Quantity of Water; yet as a large Quantity of so thick and unctuous a Substance as Tar is, cannot, by equal Times of Stirring, be so thoroughly stirred, as a lesser Quantity can; so neither can its double Quantity of Water have so strong a Tincture of the Tar, as the smaller Quantity of Water: but in the dropping way, the Strength will be in proportion

portion to the repeated Numbers of Droppings.

15. As Tar by stirring becomes of a lighter brown Colour, so it will recover its darker Colour by standing; and that soon, if warmed.

16. In these Evaporations of Tar-Water, Care must be taken to watch; when the Sediment begins to have a Syrup-like Thickness, and then to cease the Evaporation, else no certain Estimate can be made of the Quantity of Tar; because a great Part of it would be lost by continuing the Heat.

VI.
17. **A**S Tar and Turpentine are the Juices of the same Kinds of Trees, only procured in a different Manner, (the Turpentine being drawn off by Notches cut in the Fir-Trees while standing; but Tar is procured by

laying Firwood in great Heaps, and burning it while covered, with Sods or Turfs, which causes the Tar to run out at the Bottom of the Oven, as it is called, in the same manner that Sap flows from Heaps of common Wood, while burning into Charcoal :) And as Tar-Water differs much from Tar taken in the gross, so may Turpentine-Water also differ from Turpentine: I thought it therefore not improper to repeat the same Experiments on Turpentine as on Tar.

18. BUT as there is a wide Difference between the mild, native, essential Salts of Vegetables, and the same Salts, which, when they have undergone the Torture of Fire, are become very caustick; so there may probably be a considerable Difference, in the Medicinal Virtues of Tar and Turpentine-Waters.

19.

19. I made several Turpentine-Waters, both by stirring and dropping, with the same Proportion of Turpentine and Water, as of Tar and Water; and found, that by stirring four Minutes, it had a too offensive, bitterish, and peculiar Turpentine Taste.

20. I stirred the same Half-Pint of Turpentine, in twelve different Quarts of Water; toward the latter Stirrings, the Turpentine grew less and less unctuous, so as to adhere but little to the Stirring-stick; nor was it disposed to sink in the Water so much as at first, being more spongy by much stirring; and it became almost as white as Paint of white Lead. The latter of the twelve Stirrings were gradually milder, and much less bitter, than the former; the Water was very little discoloured thereby.

21. THE first and strongest of these Waters passed through the filtering Paper, without leaving any visible Turpentine ; nor was that Part of the Paper, through which it passed, more inflammable when dry, than the other Part ; yet on evaporating away a Pint of this Water, there remained six Grains of gross Turpentine ; and three Grains in a like Quantity of the twelfth Water.

22. WHEN a like Quantity of Turpentine was dropped in very slender Threads, thrice on the same Water, thro' a Strainer, whose Holes were one sixth of an Inch in Diameter, it had a disagreeable Taste of Turpentine ; and yet there remained but two Grains of Turpentine on the Evaporation of a Pint of it.

23. BUT on only once dropping of the Turpentine, it had a mild, balsamick

samick Taste, which was not disagreeable: Tho' with *Venice* Turpentine, which is drawn from the Larch-Tree, it had a stronger, more disagreeable Taste. There was a thin Oil, which separated on the Surface of the Water, from the *Venice* Turpentine. And as this Oil made the Turpentine float upon the Water, it was therefore requisite from Time to Time, gently to make them sink with a Stick, that the dropping Turpentine might touch the Water. But there was no thinner Oil separated from the common Turpentine in dropping on the Water, as there does from some Tars, whose more subtile Oil is separated from them by the Heat of Fire, in making the Tar.

VII.

24. **A**S these Tar and Turpentine-Waters were made with sweet Rain-water, in which there were Water-Gnats, (for the Waters still continue
to

to produce innumerable flying Creatures, in conformity to the great Command, at the first Institution of Nature;) so it was very observable, that these Water-Gnats, and other small Insects, died, the first in six or eight Hours, the latter in thirty or forty Hours, in Tar-Water; yet neither of them were killed in the strongest Turpentine-Water that I made; but continued brisk and lively for several Weeks: A probable Argument, that there is but little gross Turpentine incorporated in the Water, for Turpentine kills Insects.

25. Tho' the Degree of Fire which Tar undergoes in making, has made it thus destructive of the Lives of those small, tender Animals, yet we cannot thence infer, that Tar-Water is pernicious to Mankind, for the most caustick *American* Tar may be best in some Cases; there being several powerful and safe Medicines, which have undergone

undergone the most intense Degrees of Fire, and are consequently become thereby so much the more caustick, so as instantly to kill such little Animals; an Instance of this, is Salt of Worm-wood. Thus also all kinds of fermented, distilled, spirituous Liquors, which are rendered so caustick, by the Heat of Fire which they undergo in Distillation, that they will instantly kill such Insects, yet have not the like Effect on Men: tho' happy were it for Mankind if it were so; for that would effectually deter them from that destructive Pest, which, by its caustick burning Quality, however disguised with agreeable Flavours, and the plausible Name of Cordials, gradually destroys the Vitals, and thereby prematurely quenching the Lamp of Life, precipitates into their Graves vast Multitudes daily and yearly all over the World. How valuable a *Panacea* would Tar-water be, if it were as effectual a Remedy in preserving, as the

E

other

other ways in destroying Lives. Were it
 possible in the Nature of Things, that
 there could be such a Thing as a *Pana-*
acea, in the vulgar Sense of the Word,
 it was never more wanted than in the
 present Age, to counter-act that great
 Bane of Mankind. But the present
 precarious and more uncertain State
 of Health and Life, are better suited
 to our degenerate State, in order to
 restrain from farther Degeneracy, than
 such a sure Resource for Recovery of
 Health would be. Yet how eagerly
 do Mankind catch at every Similitude
 of a *Panacea*, in hopes to prolong the
 present Life, tho' but too neglectful
 of that truly salutary Water of Life,
 which kind Providence tenders us, in
 order to extend Life thro' all happy
 Eternity!

I MADE also the like Experiments
 with *Barbadoes Tar*; this being
 a *Petroleum*, or Mineral Tar, which

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issues

issues out of the Earth, with Water from whose Surface it is scummed; and therefore a very different thing from the above-mentioned Tar of Fir-Trees. I stirred three Spoonfuls of it for four Minutes, both in a Quart of cold and hot Water. The Taste of both these Waters was soft, mild, and not disagreeable; that made with hot Water was something the stronger tasted. It will not curdle Milk, nor kill little Water-Insects. Being filtrated, it leaves no inflammable Matter in the filtering Paper, tho' the Paper is a little discoloured. On Evaporation of a Pint of the Water, the more subtile, volatile Parts flying away with the Heat, there remained five Grains, of a thin-spread, water-coloured transparent Substance, of a pungent, saline Taste, which would not ferment with Spirit of Nitre. I am informed that some in *Dublin*, have drank this instead of the other Tar-Water.

27. Dr. Meighan, in his Treatise of the Nature, and very powerful Efficacy of *Bareges* Waters, in the *Pyrenean* Mountains, both by bathing and drinking, finding that their Virtue consisted in a *Petroleum*, with which they are richly impregnated, proposes, for the Benefit of those who cannot go to *Bareges*, the impregnating Water with *Petroleum*, for the like Purposes, as a substitute Remedy, where we cannot imitate the Perfection of Nature's Preparation.

28. We have seen in the Course of these Experiments, the Quantity of Tar that there is in Tar-Water; and the great Difference of that Quantity, made with different Kinds of Tar, and different Degrees of Stirring. Now, since, notwithstanding these Quantities of Tar, and the additional more subtile volatile Oil, which flies off in Evaporation, it has yet undoubtely proved an

an efficacious Remedy in many Cases and Instances; it may hence be reasonably concluded, that the Medicinal Virtue of the Water does not reside solely in the Acid, but partly also in the unctuous oily Parts, which are so temper'd by the Acid, as in some Cases to prevent their heating too much. But whereas in some Cases, it is observed by Physicians, to be too inflammatory, it is probable, that heating Quality, may in some Degree be abated, by making Tar-Water, with the Strainer above-mentioned, without Stirring; thereby to divest the Water of a good Quantity of its grosser, tarrish Particles, and yet retain whatever Powers it may have to do good.

BUT this may be done much better by the following Methods proposed by the Ingenious Mr. *Reid*.

It is hoped, that the Light given by these Researches, may be of use in

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M. DC. LXXV.

in Skillful Hands, for regulating and adapting the due Proportions of the Acid, and the oily Principles, to different Cases and Constitutions. This is the proper Province of the Physician, which I am no ways qualified to meddle in.

temper'd by the Acid, as in above-mentioned without stirring; thereby to destroy a good Quantity of the Par-ticks, and y^e weaker Powers it may have to a good.



But this may be done much better by the following Methods proposed by the ingenious Mr. Reid.

It is hoped, that the Light given by these Rectifications may be of use in

It will prove.

A
LETTER

To the REVEREND

Dr. *HALES*,

CONCERNING

The NATURE of TAR, and a METHOD
of obtaining it's *Medical Virtues*,
free from it's *hurtful Oils*: Where-
by also the STRENGTH of each DOSE
may be the better ascertained.

By *A. REID* Esq;



L O N D O N:

Printed for R. MANBY and H. S. COX on
Ludgate-Hill,
M. DCC. XLVII.

LETTER

DR. W. E. S.

CONCERNING
the Nature of Taste, and a Method
of obtaining its Medical Virtues
free from its bitter Oil: Where-
by also the Strength of each Does
may be the better ascertained.

BY A. R. D. AND



LONDON:
Printed for R. MANNING and H. S. COX on
Ludgate-Hill.
M.DCC.XLVII.

London, March 25, 1747.

S I R,

IN Obedience to your Commands I send you a few crude Observations and Thoughts upon *Tar* and *Tar-water*; and shall be happy if they furnish any Hint that may be useful to Mankind.

1. *Tar-water* has of late obtained such a Reputation, as to be esteemed by many little less than an *Universal Medicine*. However, though the Number and Variety of Cures performed by it, are equally unquestionable and surprizing, and I am far from the least Inclination to depreciate those Virtues from which so many have received Benefit; yet there want neither Arguments nor Examples to

justify a Suspicion, that in several Cases Tar-water is capable of doing Harm, when either *prepared* or *used improperly*. These Considerations joined demand a more accurate Enquiry than appears yet to have been made into the Nature of that Ingredient, from which our famed Diet-drink derives its good or bad Qualities.

2. IN the Season for barking Trees (which I understand to be when the Sap begins to rise) those intended for making Tar are stripped to the height of about eight Foot from the Ground, except one small Slip, of about four Inches broad, to preserve them from perishing. Thus they stand for one whole Year at least, that much of the watery acid Juice of the Wood being evaporated by the Summer's Heat, while very little fresh can rise, the Trees may thereby yield a thicker and more viscid Tar: And on the Condition of being thus prepared depends the Bounty granted by Act of Parliament upon that Commodity imported

ed from our Plantations. Please to observe that this is called *Green-Tar*, and is supposed to burn or corrode the Rigging, &c. of Ships much less than that made from dead Wood, or such as has lain long on the Ground; as on the other hand, that made from Trees just fell'd, without any previous Preparation, is too thin for Naval Purposes.

3. THE Trees, after this Preparation, are cut down and split into very small Billets, which in *Norway* are thrown into an Oven, but in *Sweden* and *America* are built up into a large Pile, in form and construction resembling the Ridge of an House, and covered with Turf to stifle the Flame, which would otherwise consume all the oily, gummy, resinous Parts. Fire being set to the Pile, the heated Wood discharges first a large Quantity of a thin, transparent, greenish, acid Liquor, then a light, reddish Oil; after which comes the thick Tar, and at last Pitch. These all run along a
Trench,

Trench, dug before-hand under the Oven or Pile, into a large Bason, from whence the Tar is filled with Ladles into Barrels.

4. In some Places they are at the pains before they barrel their Tar, to wash it with Water, the better to clear it of the caustic Oils, and acid Juice, and this they call *cooling* the Tar: Others content themselves with racking off the thinner Parts, after the thicker and heavier have settled to the bottom of the Barrel. In *Sweden* particularly, they have Officers who attend the Keys on purpose, and are sworn to do Justice in this point between Buyer and Seller. The acid Juice, however, is every where thrown away as useless; only in *Finland* they work it up with red Ochre pulverized, and therewith paint their Timber-Houses, which by means thereof last for 100 and 150 Years or more, in spite of all the Variety of severe Weather to which they are exposed. This embalming Quality of the acid Juice naturally leads one to ask upon what Principle

Principle it is so carefully separated from the Tar? Does Wood ever begin to decay while it retains its acid Juice? For the driest Billet, if perfectly sound, yields a great deal of it; but there is none in rotten Wood. Did not this Observation probably teach the *Finlanders* to use it as they do? Is it not the Absence hereof that renders Tar obtained from dead Wood so caustic and fiery? And is it not the Presence of this, in some Quantity at least, that gives green Tar the preference? May not this Juice, prepared either with Copperas or Ochre, preserve Ships from rotting and worm-eating, as Spirit of Vitriol with Copperas does? Certainly as the Expence would be inconsiderable, seeing Plenty of the acid Juice may be obtained from all sorts of green Wood, and Copperas as well as Ochre is far from being scarce, the Experiment seems to be worth trying by a trading Nation.

5. NOTWITHSTANDING the Care taken abroad to drain off the acid Juice,

Juice, yet when the Tar comes to us, and has stood quiet for some time, there appears still a little thereof floating on its Surface. Till that be entirely removed, the Tar is neither saleable, nor entitled to the Plantation Bounty, as not being viscid enough. The Merchant therefore spiles, pegs, or taps his Barrels, and by gradually tilting them from time to time, gets rid of all the clear Water ; for it is supposed to be no better, and as such is let run to waste. This being gone, there remains still a brown, muddy Liquor, consisting of the grosser Oils and Gums dissolved by and intimately united with some of the acid Juice. This also must be drawn off, before the Tar is merchantable ; but it is saved in little Runlets, and sold to Farmers, who therewith anoint and cure the Mange and Scab. Some again, who honestly mean to retail the very best Tar for making Tar-water, refine upon this Method, by setting the Cask on one End, keeping it full, letting it settle

well,

well, and then drawing the Tar out at bottom; by which means they are sure to serve their Customers with very little of the acid Liquor.

6. THIS Account of Tar enables us to reason a little on the Qualities which it communicates to cold Water by Infusion. I believe it will hardly be asserted that the gross Body or *resinous* Part thereof is soluble in Water, or that such a Solution, if it could be made, would be a safe Medicine: And therefore the Prescribers of Tar-water prudently order us to affuse but a certain Proportion of Water, and that but once, to the same Tar; supposing it's Virtue to be almost wholly extracted by the first Infusion, and that a second would be useless, if not hurtful. The light, æthereal, dark-coloured Oil, which swims a-top, is equally averse, of it's self, to an Union with cold Water, and is besides so fiery and caustic as to produce the most dangerous Effects, if administer'd imprudently, even in very small Quantities;

tities; being little different in it's Qualities from other essential Oils obtained either *per Veficam*, or *per Descensum*. This therefore is also rightly directed to be separated from Tar-water, either by skimming or by filtering. Now, if the gross, refinous Parts of the Tar, and the hot, inflammatory, caustic, æthereal Oils are allowed to be thrown aside as useless, or more truly mischievous, there remains nothing now that is capable of yielding any Virtue to cold Water, but the clear acid Juice, and the muddy Liquor mention'd above, §. 5. The latter of these is only the gross Sediment of the former, and consists of the heavy, half-burnt, and consequently caustic, Oils and Gums, so dissolved and united with some of the acid Juice as to mingle readily enough with Water, giving it a dirty Colour, and a nauseous Taste, extremely disagreeable both to the Palate and Stomach, not without the greatest danger of Inflammation to the Bowels and Blood of such as use it internally; nay, this
 muddy

muddy Sediment has a caustic Quality, even when applied externally; which would be much fiercer were it not moderated by the acid Juice that is combined therewith, and renders it in many Cases an excellent Topic. With good reason therefore do the Patrons of Tar-water order it, after being well stirred with the Tar, to stand quiet for some time, that it may be clarified by depositing this muddy Sediment.

7. HITHERTO there is no wide disagreement between the Tar-water-makers and me. The gross resinous Parts of the Tar can communicate nothing to cold Water, but what is hurtful: On this Principle it is agreed that Tar-water should not be made twice from the same Tar. The light æthereal Oils are so fiery and caustic, that they cannot be safely administered internally, without as much Caution as is necessary with regard to essential Oils; and 'tis accordingly agreed that they ought to be separated by skimming, or rather filtering. The heavier,
G 2 grosser,

grosser, half-burnt Oils and Gums, which sink to the bottom of the Tar-water or of the acid Juice, and therewith make a compound muddy Liquor, are also rejected by Consent as an internal Medicine, for Reasons of much the same Nature. So that at last we are reduced to seek the Medical Virtues of Tar in the clear, pellucid, greenish, acid Liquor so often mentioned; and here indeed, and here only I believe they will be found to reside. This seems to be the native, nourishing Sap of the Vegetable, except that, by the Preparation of the Trees, and the Heat of the Fire, it has lost some of it's most subtle Spirit; and it consists of a pure Water impregnated with the penetrating, active, acid Salts of the Wood, by means whereof the finest Parts of the essential Oil are perfectly dissolved, and most intimately united therewith, so as to rise together with the smallest Heat, unhurt by the Fire. Mean time the Oil is altogether undiscernible to the Eye, unless by it's natural,

natural, greenish Colour, either when alone, or when you add to it a greater or lesser Quantity of simple Water; only upon the first Admixture a few Streaks discover it, but soon disappear. This Compound therefore appears to be a true, volatile, fluid, acid Soap, and both from it's Composition and Experience will be found an excellent, attenuating, deobstruent, alterative Medicine: and tho' I do not pretend that it is a proper, much less a sovereign Cure for all Ailments whatever, yet I am fully persuaded it may be so prepared as to be much more beneficial, where it is proper, and much less hurtful, where it is improper, than the Tar-water prepared in the usual manner.

8. IF, what I have said above be just, it is plain that the Makers of Tar abroad, and the Venders of Tar at home, take a great deal of Pains to rob it of all that is medicinally useful, and that the more conscientiously careful they are to provide their Customers

tomers with the best Tar, so much the more unfit do they render it for preparing wholesome Tar-water. Nay, this is evidently true, go upon what Principle you will; unless you should think, as I am confident you cannot, that the admirable Virtues of Tar-water are derived solely from the gross refinous Body of the Tar. If they are, I ask again, (for the Questions seem of Consequence) what signifies the Caution of drawing Tar-water but once from the same Tar, and leaving as much of the gross Part as can be left behind? If they are not, then why are all the finer, thinner Parts drained off with so much Care from the grosser, so as to leave little else behind? Very little indeed that can be taken up by Water, besides some of the hot adust Oils and Gums dissolved by a small Portion of the acid Juice. And if these are of Service, why are they drain'd off from the Tar, and why must they settle to the Bottom of the Tar-water, before

fore it is fit to be used? Ought it not rather to be drank whilst yet muddy with them? On the contrary, you are justly cautioned against Tar-water of too deep a brown Colour, which is owing wholly to the burnt Oils swimming therein; that is, to the muddy Liquor. If the fiery æthereal Oil be a good Ingredient, why then is it skimmed off, or separated by the Filter? Again, If the acid Juice be not beneficial, why is its Presence made the Test of good Tar-water, which is esteemed better or worse as it discovers more or less thereof? If it be, why is it so carefully drain'd off from the Tar, and so carelessly thrown away? Fortunately indeed for the Drinkers of Tar-water, some small Portion of the acid Juice, notwithstanding all the Pains taken to get rid of it, still remains with the Tar, or else it must e'er now have done an infinite deal of Mischief, and lost that Reputation to which, but for this Acid, it could have no Title. However, the brownish
Colour,

Colour, the disagreeable Smell, and
 above all, the nauseous Taste of the
 Tar-water commonly used, sufficiently
 shew that the very small Quantity of the
 acid Juice taken up thereby, carries
 with it much of the adust, heating,
 inflammatory, caustic Oils and Gums;
 that is, the clear acid Juice having
 been almost entirely drawn off, the
 Water has nothing to work on but
 the muddy Liquor or Sediment, the
 Qualities whereof are shewn above:
 And to this we may fairly and natu-
 rally ascribe all the Prejudice done
 by Tar-water, especially to hot, bi-
 lious Constitutions. I have lately
 heard an Instance to confirm me in
 this way of thinking, which seems to
 deserve your Notice. A Physician of
 my Acquaintance at *Dumfries*, hav-
 ing endeavoured according to Art,
 but in vain, to cure a Servant-Maid
 quite worn out with Illness, had re-
 course at last to Tar-water, which in
 a very short time restored her to perfect
 Health. The Footman observing this
 good

good Effect, went to the Jar in which the Tar-water stood, and took a Draught of what the Maid had left. This proved to be the brownish muddy Sediment of the Tar-water ; for the Maid had drank most of what was clear ; and it produced such a terrible Inflammation in his Bowels and Blood as had well-nigh cost him his Life, which was for many days despaired of, and his Friends call'd in to see him die. I do not, however, pretend that these, like other essential Oils, for such they are, may not be of good use, when prudently and moderately administer'd to Patients of cold, languid, flaccid, effœte Constitutions ; but I labour to prove that they are not fit to be given to every body, nor by every body, because they may do irreparable injury to many ; that all Tar, especially that which is honestly but ignorantly sold as the best, is not fit for making wholesome Tar-water ;

H

that

that those who prepare Tar-water, either for Sale or their own Use, are seldom competent Judges when it is well or ill made ; that the more conscientiously they go to work, the worse they succeed, and must do so as long as they act upon wrong Principles ; that by separating and throwing away the acid Juice of the Tar they rob it, as far as they can, of all Medical Virtue ; that tho' a small part of the acid Juice, after all their Care, still remains with the Tar, yet as there must needs happen to be more of it in some than in other Tar, it is not possible for the best Judge to ascertain the due Proportion of Water to Tar ; that as the heavier and grosser Parts subside to the bottom, the upper-most Parts will contain more of the acid Juice, than the undermost ; therefore it is scarce possible for the most accurate Operator to prepare Tar-water twice of the same Quality, tho' each time he uses fresh Tar out of the same Barrel, and in the same Proportion to Water ; and that therefore
the

the pure acid Juice, if it could be had, would be in all respects the proper Ingredient to mix with Water for a wholesome Diet-drink, as that native, oily, volatile, acid, liquid, Soap contains all the good Qualities of the Tar, is free from all the Inconveniencies objected to, and as the Strength of each Dose may by means thereof be more exactly determined, and it's true Effects better ascertained, than can ever be done by the present loose, uncertain manner of preparing Tar-water.

9. FINDING it difficult, at present, to get any Quantity of this pure acid Juice, as originally distilled from the Wood in making Tar, I bethought myself of trying what I could obtain from the muddy Sediment, commonly sold to Country-folks; and having procured a small Keg thereof, I filtered some of it, first by itself, and afterwards with a large Mixture of Water; but to little purpose, for it still remained muddy and full of a gross, hot Oil. Therefore I put about six Quarts thereof

unmixed into a Glass-Retort, luted on a Receiver, and with a gentle Sand-heat drew off it's acid Juice, which it yielded much purer, and in greater Quantity than I expected. Mean time a very subtile, penetrating, acid Spirit perspired incessantly through the Lute, which I therefore frequently renewed. When I perceived the Contents of the Retort to grow very thick and viscid, I put out the Fire, suffered all to cool, and took off my Receiver, in which I found about three Quarts of a clear acid Liquor, with near a Gill of a dark-coloured, caustic, æthereal Oil swimming on it's Surface. In the Retort there remain'd a black, glassy, tough Pitch. Some part of the æthereal Oil I skimmed off, and having carefully separated the rest by Filter, first thoroughly wetted, and kept always nearly full during the Operation, that the Oil might not insinuate itself thro' the Paper, I obtained a very pure, clear, acid Juice, not ungrateful to the Palate, and so strong that

that one Part thereof added to Thirty-two Parts of Water made an agreeable Potion, perfectly fine, and free from those gross, empyreumatic, hot Oils, which render common Tar-water unpleasant to the Taste, nauseous to the Stomach, and often prejudicial to Health. The nicest Lady, or the tenderest Child, may drink this Preparation without the least Reluctance: and I dare say, it will be found at least equal, in it's good Effects, to the best Tar-water made in the common way, and for safety much preferable; not only because it is free of those Ingredients which may prove hurtful in the other, but chiefly because by this Method of obtaining the Medical Virtues of Tar without any of it's noxious Qualities we gain this important Advantage, that the Strength of the Dose may be more accurately determined, and the Medicine itself by that means better accommodated to each Patient's particular Case, than by any other that I know of; unless
the

the native acid Juice, just as it distills at first from the Wood in the making of Tar, may be esteemed fitter for the purpose, when it can be had. I heartily wish the Gentlemen of the Faculty would think this Subject worthy of their Attention, and give such Directions about it to their Pharmaceutical Operators, that every Man may not be left to quack for himself, and so through mere Ignorance to ruin instead of recovering his Health. Mean while Messieurs *Mackenzie* and *Watts*, Oilmen in *Bishopsgate-Street*, having desired and received my Instructions for preparing the acid Juice of Tar in the manner aboved specified, will I suppose soon be ready to supply such as may be inclined to use it, without the trouble of distilling it themselves.

10. To those, however, who chuse to continue the present Method of making Tar-water, I beg leave to recommend it as a proper Experiment for trying the goodness of their Tar
before

before, or of their Tar-water after it is made, to pour a little thereof on some bits of Chalk : If an Effervescence does not presently follow, then they may be sure the Tar or Tar-water is not fit for their Use ; but the stronger the Effervescence proves, so much the better are they to be counted. It is also proper to caution those who may attempt to distill this Acid, especially from a thick Tar, that they ought to be careful not to raise the Fire too high, and to put it out as soon as the Balsam in the Retort grows pretty viscid ; lest, if urged then too strongly, it should swell and run over, and so endanger both the Operator and the House. If you perceive a black, thick Smoak to rise into the Neck of the Retort, or come over into the Receiver, stop quickly, for you have already gone too far.

II. I have all along taken it for granted, that Tar is possessed of excellent Virtues, which it communicates to cold Water by Infusion. This cannot

not be denied, because a Multitude of Facts have appeared to vouch it, since the first Publication of the Benevolent Bishop of *Cloyne's* learned, elegant, entertaining Recommendation of it. But at the same time I have endeavoured to shew that, by improper Management, Water may acquire from it some hurtful Qualities, and also how that Inconvenience may be avoided ; but particularly that it's salutary Effects must be attributed wholly to the native, oily, acid Sap of the Vegetable. I shall next shew that there is both Authority and Experience for assigning such Virtues to the acid Juice of Vegetables.

12. FOR the former, as I have not leisure, neither do I think it necessary to consult the Ancients ; and shall only observe that *Pliny*, who compiled from the Works of all his Predecessors whatever he thought valuable, writes thus in his History of the World, B. xvi. C. xi. “ *Pix liquida in Europa e teda*
“ *coquitur, navalibus muniendis, mul-*
tosque

“ *tosque alios ad usus. Lignum ejus*
 “ *concisum furnis undique terra cir-*
 “ *cumdatis igni fervet :*” [This is the
 true reading ; see *Dalecamp's* Edition.]

“ *Primus sudor aquæ modo fluit ca-*
 “ *nali : hoc in Syria Cedrium vo-*
 “ *catur, cui tanta vis est, ut in Æ-*
 “ *gypto corpora hominum defunctorum*
 “ *eo perfusa serventur. Sequens li-*
 “ *quor, crassior jam, picem fundit.*”

Hence we see, that the Ancients drew Tar from Wood, much in the same manner as the Moderns do, and that they took Notice of the acid Juice which first distills in the Operation : But as to the Uses thereof nothing is here said, except that the *Ægyptians* employed that of Cedar to embalm and preserve dead Bodies withal ; which I do not find that the Antiquarians, in their Researches into the Nature of Mummies, have ever observed ; nor what the same Author B. xxiv. C. v. says again, “ *Cedri succus ex ea quo-*
 “ *modo fieret, diximus. — Defuncta*

I

“ *corpora*

" corpora incorrupta ævis servat. Vi-
 " ventia corrumpit : mira differentia,
 " cum vitam auferat spirantibus, de-
 " functis pro vita sit." He adds, " Vestes
 " quoque corrumpit, animalia necat.
 " Ob hoc non censeam in anginis hoc
 " remedio utendum, neque in crudita-
 " tibus, quod suasere aliqui, gustandum.
 " Dentes quoque colluere ex aceto in
 " dolore timuerim, vel gravitati aut
 " vermibus aurium instillare.—Phthi-
 " riasas perungere eo non dubitave-
 " rim, itemque porrigines. Suadent &
 " contra venenum leporis marini bi-
 " bere in passo. Facilius in elephan-
 " tiasi illinatur. Et hulcera sordida,
 " & excrescentia in iis autores qui-
 " dam, & oculorum albugines caligi-
 " nesque inunxere eo : & contra pul-
 " monis hulcera cyathum ejus sorbere
 " jusserunt : item adversus tineas.
 " Fit ex eo & oleum, quod pisselæon
 " vocant, vehementioris ad omnia ea-
 " dem usus." From this Passage of
 Pliny it is plain the Ancients never
 thought of separating the pure acid
 Juice

Juice from the caustic Oils, but used both together ; and therefore no wonder if they found reason to be afraid of administering the Compound internally, tho' it seems some Quacks ventured upon it now and then. Nay, our Author declares even against washing the Mouth with it in the Tooth-ach, lest it should be prejudicial, *ex aceto*, by it's Acidity ; not considering that the Mischief was owing entirely to the caustic Oils. However, he seems to come readily enough into the mere external Use thereof, in Cases where both the acid Juice and hot Oils are allowed to be of service. 'Tis true, I can gather nothing from these Quotations altogether in favour of the internal Use of acid Juice ; but so far as the Experience and Authority of the Ancients goes, they confirm what I have so often inculcated concerning the caustic Oils.

13. FROM *Pliny* down to *Glauber* I can recollect nothing that intimates any Notice or Use of this acid Juice ;

unless you will allow it to have been *Van Helmont's volatile Salt of Tartar*, which he praises so immoderately, and to which he ascribes Powers very little inferior to those of his boasted Alcahest. Indeed, as the Crystals of Tartar contain the native acid Salts and essential Oils of the Vegetable, so this Juice consists of those same Principles, but exceedingly more fine, volatile, and free from those gross Parts with which Tartar abounds. It seems therefore, that it may be justly called the *Sal volatile oleosum Tartari*.

14. THE industrious *Glauber* comes next ; and he in his *First Part of Philosophical Furnaces* shews professedly, “ how to distill an acid Spirit or “ Vinegar out of all Vegetables, in “ great Quantity and at small Expence, which he affirms to be “ good in many “ Diseases, causing Sweat wonderfully “ when taken internally, especially “ that which is made of Oak, Box, “ Guaiacum, Juniper, and other heavy Woods ; for how much heavier “ the

“ the Woods are, so much the more
 “ acid Spirit do they yield. Being
 “ used outwardly it mundifies Ulcers,
 “ consolidates Wounds, extinguishes
 “ and mitigates Inflammations caused
 “ by Fire, cures the Scab, but espe-
 “ cially if a Decoction of its own
 “ Wood be made in the same.
 “ Being mixed with warm Water
 “ for a Bath for the lower Part of the
 “ Body, it cures the Diseases thereof,
 “ and particularly malignant Ulcers
 “ of the Legs.” Nay, so thoroughly
 was he convinced of the great Virtues
 of this acid Juice, that he thought it
 worth while to contrive a peculiar Fur-
 nace for procuring it, an Account of
 which, and it's Use, he gives us in
 the Continuation of his *Miraculum*
Mundi, Arcan. I. It may not be a-
 miss to make a few Extracts from him,
 relating chiefly to the Medical Uses
 of the *Vinegar of Wood*. He observes,
 “ that the expressed (it should be *dis-*
 “ *tilled*) Juice carries along with it
 “ a sharp, hot Oil, of a dark reddish
 “ Colour ;

“ Colour; that if this acid Spirit be
 “ rectified (or *freed from the afore-*
 “ *said Oil*) it may be used in the
 “ Preparation of good Medicines, and
 “ for all Purposes for which common
 “ Vinegar is used; yea, far more
 “ commodiously, because it much
 “ exceedeth that in Sharpness. Nay,
 “ of itself alone it cureth many other-
 “ wise incurable Diseases: being mix-
 “ ed with warm Water, in the Pro-
 “ portion of one Part of acid Juice
 “ to ten Parts of Water, more or less
 “ as Circumstances require, it is a
 “ more efficacious Bath than any that
 “ issues out of the Earth; particularly
 “ in all Scabs, Foulnesses of the Skin,
 “ the *French* Disease, fistulous and
 “ stinking Ulcers in the Legs and
 “ other external Parts. Also in the
 “ Gout, Stone, Cramp, Sciatica, Pal-
 “ sy, and all sorts of Ailments for
 “ which Baths are proper, this Vine-
 “ gar of Wood far excelleth in salu-
 “ brious Virtues. The hot Oil also,
 “ which riseth with the acid Spirit,
 “ exerteth

“ exerteth a wonderful Efficacy in
 “ curing external Ulcers and other
 “ Ailments. Those who use this
 “ Bath should, before they go into
 “ it, drink some Spoonfuls of the
 “ Vinegar of Wood; which, by
 “ penetrating the whole Body, casteth
 “ out all Things superfluous and
 “ noxious to Nature by Sweat, and
 “ openeth all Obstructions of the Li-
 “ ver, Spleen, and Lungs; especially
 “ when the Vinegar is drawn from a
 “ Vegetable naturally proper to cor-
 “ rect the Disease.” [*Here he enters
 into a Detail of Vegetables, and their
 peculiar Properties, agreeable to his
 idle Notion of Signatures.*] “ A few
 “ Drops of the Oil (*before separated*)
 “ may also be added to the Spoon-
 “ fuls of Vinegar taken before the
 “ use of the Bath, which so fortifieth
 “ the acid Spirit, that it more readily
 “ penetrateth the Body, more forci-
 “ bly assaulteth the Disease, and the
 “ sooner expelleth it. In gouty Pains,
 “ and in the Stone of the Kidneys,
 “ the

“ the Oil and acid Spirit together being
 “ rubbed on the Part affected, give a
 “ Relief not to be contemned. In short,
 “ this Juice of Woods and Herbs, duely
 “ prepared and used, is so efficacious a
 “ Medicine, that the most costly *Galenical*
 “ *Cal* Compositions must give it place.”
 Now, tho’ I do not quote *Glauber* either
 as a Physician, or Philosopher, yet he
 certainly was an experienc’d Chymist
 and Apothecary; he was withal, as far
 as I can find, exceeding honest, when
 he spoke plain enough to be understood,
 and would hardly have said so much in
 praise of the Vinegar of Woods and
 Herbs, if he had not proved its Efficacy.
 But, tho’ he might have good Cause to
 recommend the internal Use of the acid
 Liquor in so many various Distempers,
 yet I cannot help thinking that he judg-
 ed wrong in adding to it generally the
 caustic æthereal Oil, even in a small
 Quantity; and the Reason he gives for so
 doing is more specious than Philosophical.

15. THE celebrated Mr. *Boyle* wrote
 much about the same time with *Glauber*,
 and

and tho' in his *Scept. Chym.* Part III. he says he had not tried any Medical Experiments with the acid Juice of Vegetables, yet he makes his Friend observe, that "they are manifestly endowed with peculiar and powerful Qualities, some of which may probably be of considerable use in Physic, as well alone as associated with other Things." In his *Producibleness of Spirits*, he makes several Remarks and Experiments on the acid Juice of Vegetables, "but owns he had not discovered their positive Properties." The acid Juice he separates into two Parts, an acid and a neutral Spirit; the former whereof he seems to think the most ponderous, but far from being the greatest in Quantity; [Observe that he made use of the distilled Acid of *Box-wood*] and that the hardest Woods yield the strongest Acid. He adds, "Whether our adiaphorous [*neutral*] Spirit may (as I sometimes suspected it may) be generated by a commixture of the finer Parts of the

belonging " K " Oil

“ Oil of the Wood reduced to an extraordinary smallness, and thereby made capable of being exquisitely mixt with the Phlegm, and strictly associated with it's Particles, I shall stay till I be better furnished with Experiments before I venture to determine.”

16. THE great *Boerhaave* is much more particular and directly to the Purpose. He treating in his 3^d Process of the Oils, Vinegar, Spirits, &c. procured from Guaiacum Wood by Distillation, observes, “ that all Trees, and Shrubs universally, as well as a great many Herbs, treated in the same manner yield the same things ; and particularly a Water containing an acid, oily, volatile Salt, which being properly depurated and rectified, has a very penetrating, aperient, attenuating, antiseptic, detergent, and saponaceous Virtue, and on these Accounts is antiscorbutic, diuretic, diaphoretic, and sudorific: externally also it is of service.” And again, “ this distilled Vinegar is composed

“ composed of Water, an Acid, and an
 “ Oil, and consequently may with the
 “ greatest justness be called an oily, fa-
 “ ponaceous, volatile, acid Salt.” In
 Process 35, treating of the Vinegar,
 Spirits, Oils, &c. procured in the
 same manner from Turpentine, he tells
 us that “ the acid Water which it yields,
 “ if perfectly freed from it's Oil, and
 “ rectified, is perhaps one of the best
 “ vegetable Acids we are acquainted
 “ with ; that it is eager, antiseptic, pe-
 “ netrating, and endued with conside-
 “ rable medicinal Virtues, but easily
 “ exhales: that the nutritious Juice is
 “ acidish and watery when first taken
 “ up from the Earth by the Plant, in
 “ which it gradually deposits it's pin-
 “ guious, oily Particles. Is the native,
 “ volatile Acid, says he, that resides in
 “ this pinguious, oily Liquor and Water,
 “ of the same Nature with the aromatic
 “ Spirit of other essential Oils? Certain-
 “ ly, in these native pinguious Sub-
 “ stances it is contained and mixed in
 “ such a manner, that with the Water
 “ it

“ it lies concealed under one uniform
 “ Appearance.”

17. I hope I have now produced sufficient Authority for my Opinion : but as Experience is the surest Test, I appeal to the immemorial Practice of those who live near the Places where Tar is usually made. They, instructed by Chance and convinced by Experience, use Tar-water for all Complaints; not indeed such as we make here ; for they drink the pure, acid Liquor which swims naturally on the Surface of the Tar, after all the gross Parts have subsided, and the æthereal Oil is skimmed off. Some take it alone, others mingled with a little Water: those only make it in some measure, tho' not so badly, as we do, who are forced to bring their Tar from a distance. It has also been long usual, even among us, for consumptive, decayed, worn-out People, to repair to the *Red-house* at *Deptford* as their last Resort, there drink the clear Liquor from the barrelled Tar, and be cured. I believe I am well inform'd as to these Facts,
 and

and if they be true, they fully justify all I have advanced in favour of the acid Juice of Tar.

18. I have §. 13. intimated an Inclination to believe and call this acid Juice a *Sal volatile oleosum Tartari*. Boerhaave tells us that "some of the most skilful Chymists have asserted Vinegar to be a volatile Tartar of Wine; because Tartar is the most acid Part of Wine, but not volatile; and Vinegar is Wine converted into an Acid, but a volatile one." He adds that it is a volatile, oily, acid Salt; and by these Characters this Production of Art seems not altogether unlike the native acid Juice of Vegetables. There is also a great Affinity in their Effects; for the same Author assures us that "Vinegar is vastly beneficial to the human Body, by it's Acidity resisting Putrefaction, so incident and so dangerous to the animal Humours, while at the same time it is soften'd and render'd less acrid by it's Oils; that it is so penetrating as to make
" it's

" it's way, without any separation of
 " it's Parts, through almost the whole
 " human Body, and exert it's proper
 " Powers there, especially being assisted
 " by the natural Heat and vital Motion;
 " that it will readily mix with all the
 " animal Fluids, by which Property and
 " it's penetrating Power it produces ad-
 " mirable Effects; that in Fevers, caused
 " by an acrid Bile, an alcalescent Salt,
 " or any thing putrid generated in the
 " Body, it is an admirable Cooler of
 " the internal Heat, and a Quencher of
 " the Thirst which attends them; that
 " in such Cases *Dioscorides* and *Hippo-*
 " *crates* extol the use of Vinegar and
 " Water, especially when rendered
 " milder by an addition of Honey; that
 " in external Maladies, such as Eresy-
 " pelases, Phlegmons, and putrid Ul-
 " cers, the Surgeons find it of the great-
 " est Service; that a Man dead drunk
 " may be roused by giving him Vine-
 " gar; that to weak, languid, drowsy,
 " lethargic Persons, and those afflicted
 " with Faintings and Vomitings, he had
 " given

" given Relief by applying Vinegar to
 " the Nose and Mouth, or administering
 " it inwardly, when every thing else
 " fail'd ; that even in convulsive, hy-
 " pochondriacal, and hysterical Cases
 " he had known it do good ; that in
 " a true Putrefaction and deadly Cor-
 " ruption of the Humours, and in pre-
 " venting the spreading of a Gangrene,
 " it has scarce it's equal ; that in acute
 " Fevers therefore, in malignant putrid
 " Fevers, in the Plague, Small-Pox,
 " Measles, and the like Distempers,
 " where volatile alkaline Salts are used
 " with such unhappy Success, Vinegar
 " is an excellent Medicine ; that it is
 " a most certain and efficacious Sudo-
 " rific, procuring Sweat, taken either
 " alone or diluted, in malignant Dis-
 " tempers, where hardly any thing else
 " succeeds." Such, according to our
 " great Author, are the wonderful Ef-
 " fects of Vinegar prepared according
 " to Art, not of such as is sold for com-
 " mon use, too often adulterated with
 " Vitriol, and at best full of Yeast.

But

But Tar-water duly prepared, the acid, oleous, Juice of Wood, the Vinegar of Nature, boasts the same and much more extensive Virtues, as appears from the Bishop of *Clayne's* and Mr. *Prior's* Accounts of the Effects of Tar-water, made even in the common manner. This natural Vinegar is more easily and certainly prepared pure and good than the artificial one, and is much richer of the native Oils, so as to want no addition of Honey to render it milder, while the other is in preparing it by Fermentation deprived of a great deal thereof; whereas here the Sap, the Salts, and Oils are all nearly in their native State, seeing they are procured saturated with each other, by such a gentle Heat, that they may rather be said to be expressed than distilled.

19. MAY not this compound Juice be called the Chyle of Plants? It would seem that the pinguious Parts of the Soil being dissolved by the universal Acid of the Earth, and intimately united with elementary Water, are rarified by the Heat

Heat of the Sun, attracted or imbibed by the fine Vessels of the Vegetable, and carried up together for the growth and increase thereof; and then the Water with the Acid gradually perspiring leaves the pinguious Parts behind, first in the form of Oils, then of Balsams, next of Gums, and lastly of Refins. Is not this the *Spiritus Rector* of Oils and Balsams, to which *Boerhaave* inclines to ascribe their Virtues? For if the acid Juice be suffered to exhale in the open Air, or be expelled by Fire, the thinnest Oils become by degrees thick, unctuous Balsams, then stiff Gums, and at last friable Refins, always as they change losing more and more of their medical Efficacy. If so, 'tis not strange that this Juice should easily dissolve even Myrrh it self, nor therefore that it should produce such salubrious Effects in the human Body, by dissolving gummy Concretions, Viscosities, and other Obstructions to the due Circulation of our Fluids; nor why

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that

that Liquor which is the Life of Vegetables should be so beneficial to the Health of Man.

I shall esteem myself very happy if any thing I have said may contribute to make this excellent Medicine still more universally useful and safe ; and am,

SIR,

Your most Obedient,

Humble Servant,

ANDREW REID.

P. S. Your Experiments in order to discover and lessen the Quantity of gross Tar in Tar-water, having led me to examine it's distilled acid Juice in your manner, I found that an Ounce Troy thereof being set to exhale in the open Air, there remain'd no gritty Tar, but only ten Grains, or $\frac{1}{4}$ Part, of an amber-coloured Rob, extremely tart, and of a bitterish Taste, not unlike that of common Tar-water; so that as one Ounce of the acid Juice added to thirty-two Ounces of Water, makes about a Quart of good Tar-water; you have in every Half-pint thereof about two Grains and a half of this *Residuum*, or Soap, consisting of the essential Oil united with the Acid.

I have made several other Trials of this acid Juice, which I must take another Opportunity of communicating. Mean time, I am thereby much encouraged

couraged to hope that the Method
of preparing Tar-water which I have
pointed out will be found beneficial,
and be adopted by the Gentlemen
whose Province it is to prepare and
to prescribe wholesome Medicines.

Troy thereof being set to exhale in
the open Air, there remain'd no gritty
Tar, but only ten Grains, or
Part of an amber-coloured Rob,
extremely tart and bitterish. **F I N I S**
Taste, not unlike that of common
Tar-water; so as one Ounce of
the acid Juice added to
Ounces of Water, makes about a
Quart of Sugar. You have
in every half-pint thereof about two
Grains and a half of this Residuum,
or Soap, contains the essential
Oil united with the Acid.



I have made several other Trials
of this acid Juice, which I must take
another Opportunity of communicating.
Mean time, I am thereby much en-
couraged

